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PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NE-70139WO	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP2003/015416	International filing date (day/month/year) 02 December 2003 (02.12.2003)	Priority date (day/month/year) 02 December 2002 (02.12.2002)
International Patent Classification (IPC) or national classification and IPC G01N 1/00, 27/447, 27/62, 30/60, 30/72, 33/48, 35/08, 37/00, B01D 57/00, 57/02, B81C 1/00, H01J 49/26		
Applicant NEC CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 02 December 2003 (02.12.2003)	Date of completion of this report 05 August 2004 (05.08.2004)
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP2003/015416

## I. Basis of the report

### 1. With regard to the elements of the international application:\*

- ☒ the international application as originally filed
- ☐ the description:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the claims:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, as amended (together with any statement under Article 19  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the drawings:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

### 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

### 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

### 4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

### 5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

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## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; . citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Claims	1-28	YES
	Claims		NO
Inventive step (IS)	Claims	1-9, 16, 17, 19	YES
	Claims	10-15, 18, 20-28	NO
Industrial applicability (IA)	Claims	1-28	YES
	Claims		NO

### 2. Citations and explanations

Document 1: JP, 2002-257838, A (Yuzuru Takamura), 11 September, 2002 (11.09.02)  
Document 2: JP, 2001-518614, A (The Regents of the University of Michigan), 16 October, 2001 (16.10.01), & WO, 99-17093, A1, & EP, 1007873, A, & US, 6057149, A1  
Document 3: JP, 2001-503854, A (Gamera Bioscience Corp.), 21 March, 2001 (21.03.01), & WO, 98-07019, A1, & EP, 865606, A, & US, 6143248, A1  
Document 4: JP, 10-132712, A (Kyoto Daiichi Kagaku Co., Ltd.), 22 May, 1998 (22.05.98), & EP, 803288, A, & US, 6001307, A1  
Document 5: WO, 01-002737, A1 (Gyros AB.), 11 January, 2001 (11.01.01), & EP, 1194696, A, & SE, 9902474, A  
Document 6: JP, 8-510597, A (Mayo Foundation for Medical Education and Research), 5 November, 1996 (05.11.96), & WO, 64-17538, A1, & EP, 680689, A, & US, 5643247, A1

#### Claims 10-15

Document 1 (refer particularly to the summary, claim 1, Figs. 1 and 2) describes a drive device wherein a pump with controllable power in combination with a passage where a plurality of obstacles like a line of dots capable of trapping a moving interface by surface tension are disposed is formed on the same chip, whereby a pulse power exceeding a trap makes the traps ineffective, and positioning in steps is possible.

Document 2 (refer particularly to [0065]-[0072], Figs. 3 and 4) describes a technology wherein liquid put in an injector is pulled by a surface force, stops at a hydrophobic region 40 adjacent to the liquid in a channel, and the front part of the liquid is moved by a gas intake route 50 connected to the channel with fluid and transported to a prescribed position beyond the said hydrophobic region 40.

Document 3 describes a technology wherein a hydrophobic region is provided in a part of an extremely thin stream to prevent liquid from entering therein, and then a centrifugal force is created to move the liquid over the said hydrophobic region.

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## Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of : V

Document 4 (refer particularly to [0111]-[0182], and Figs. 9-21) describes a technology wherein a capillary phenomenon that occurs in an air-ventilation passage, and a pull pressure produced by bending the cover for a pull-pressure-generating chamber, are used in combination as a means of liquid transportation in microchips.

Accordingly, documents 1-4 describe a liquid switch having a passage of a liquid, and a dam provided in the passage to dam the said liquid, wherein the said dam has a member to retain the said liquid or a surface lyophobic for the liquid, and, in a microchip technology using flow injection, using a plurality of particles, a porous body, a plurality of projections, etc. to increase the surface area of a passage, with a view to increasing the resistance in the passage, is a well known technology. Therefore, it is not considered particularly difficult to use such members in the dam.

Accordingly, a person skilled in the art could have easily conceived of the subject matters of claims 10-15 based on the inventions described in documents 1-4 and the above-mentioned well-known technology.

### Claim 18

"A material lyophobic for a first liquid" described in claim 18 corresponds to an air introduced by a gas intake route 50 connected to the channel with fluid in document 2.

Accordingly, a person skilled in the art could have easily conceived of the subject matters of claims 10-15 based on the inventions described in documents 1-4, particularly that in document 2, and the above-mentioned well-known technology.

### Claims 20-28

It is common technical knowledge that, in MALDI-MS analysis, a protein sample is pre-treated by means of a separation process, an enzyme digestive process, a drying process, etc., and so a person skilled in the art could have easily had some or all of such processes performed by means of a microchip.

Accordingly, a person skilled in the art could have easily conceived of the subject matters of claims 20-28 in view of the inventions described in documents 1-4, the above-mentioned well-known technology, and the above-mentioned common technical knowledge.

### Claims 1-9, 16, 17 and 19

Document 5 describes a method for controlling the flow in a micro-channel structure by means of (1) a polymer plug having a characteristic of changing its volume between a first volume and a second volume according to a first state wherein the first volume is provided to block the flow of liquid in the said channel in response to energy externally applied to at least one site in the said micro-channel structure, and a second state wherein the second volume is provided to give a flexible passage for the flow of liquid, and (2) a polymer valve to selectively apply an appropriate form and degree of energy to the said polymer plug so that the said polymer plug can change its volume according to the first and second states whereby the said polymer comes into the said first or second state.

Document 6 describes approximately a switching element using the condensation/back of polymer matrix micro particles.

However, a liquid switch having (1) a passage passing through a first liquid, (2) a dam provided in the said passage to dam the said first liquid, and (3) a trigger passage communicating with the said passage at the said dam or a point downstream from the said dam to guide the second liquid to the said dam, is not described in any of the documents including the above-listed documents 5 and 6 cited in the ISR, and a person skilled in the art could not have easily conceived of the subject matters of claims 1-9, 16, 17 and 19.